Rock County Groundwater Nitrate Issue

5/29/2019

SPEAKERS TASK FORCE ON WATER QUALITY

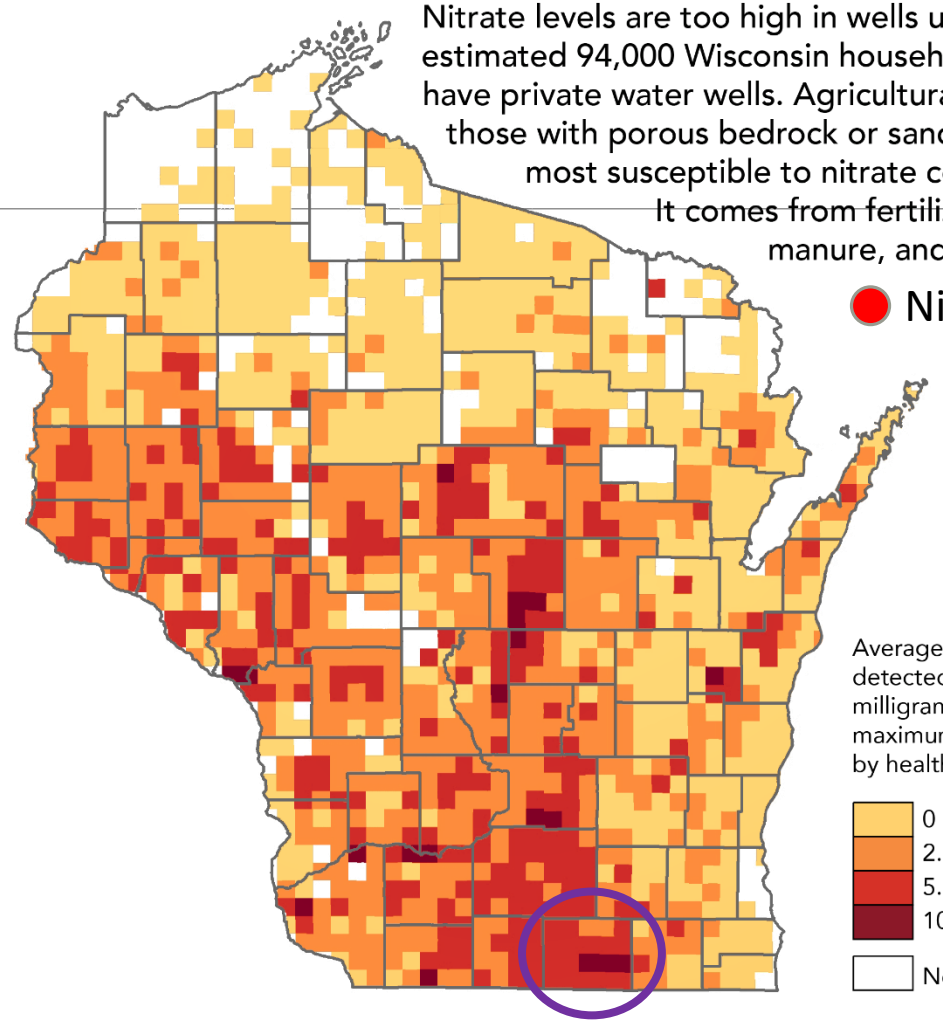
Why are Nitrates an Issue?

- Known Health Impacts
  - - Contributing cause to blue-baby syndrome
  - - Health Standard set at 10 mg/L
- Possible Other Health Impacts
  - - Links to birth Defects?
  - - Thyroid disease, diabetes, cancer links?

"Indicator" of Groundwater Health

Nitrate in drinking water around Wisconsin

Nitrate levels are too high in wells used by an estimated 94,000 Wisconsin households that have private water wells. Agricultural areas and those with porous bedrock or sandy soil are most susceptible to nitrate contamination. It comes from fertilizers, including manure, and other sources.



Nitrates > 10 ppm

Average amount of nitrate detected by township (in milligrams per liter). The maximum amount allowed by health standards is 10 mg/l.

- 0 - 2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 20.0
- No Data Available

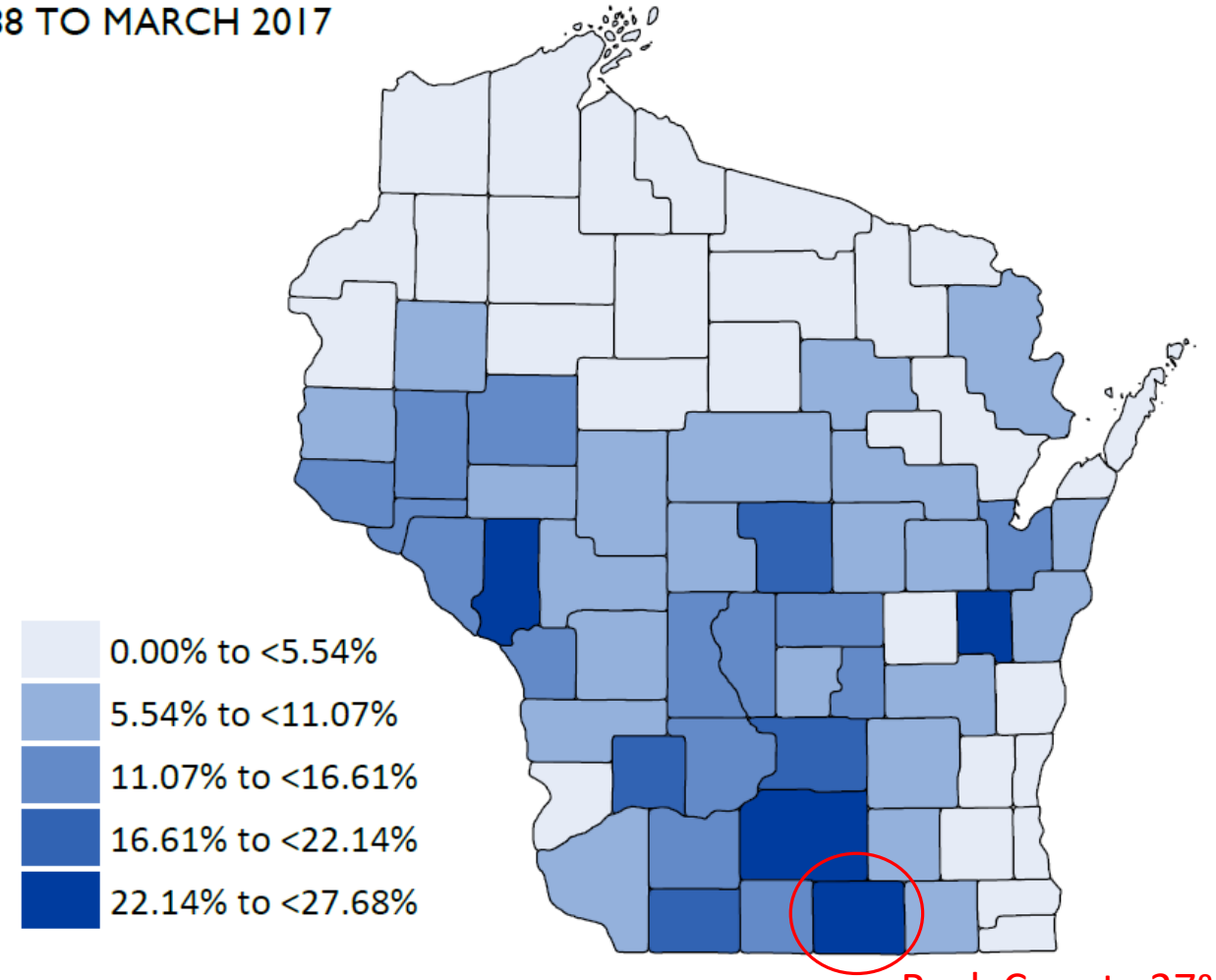
CREDIT: Katie Kowalsky/Wisconsin Center for Investigative Journalism

SOURCE: Well Water Quality Viewer, University of Wisconsin-Stevens Point's Center for Watershed Science and Education. Private Drinking Water Quality in Rural Wisconsin, Journal of Environmental Health, 2013.

NITRATE IN PRIVATE WELLS

PERCENT OF TEST RESULTS ABOVE EPA STANDARD OF 10 mg/L

1988 TO MARCH 2017

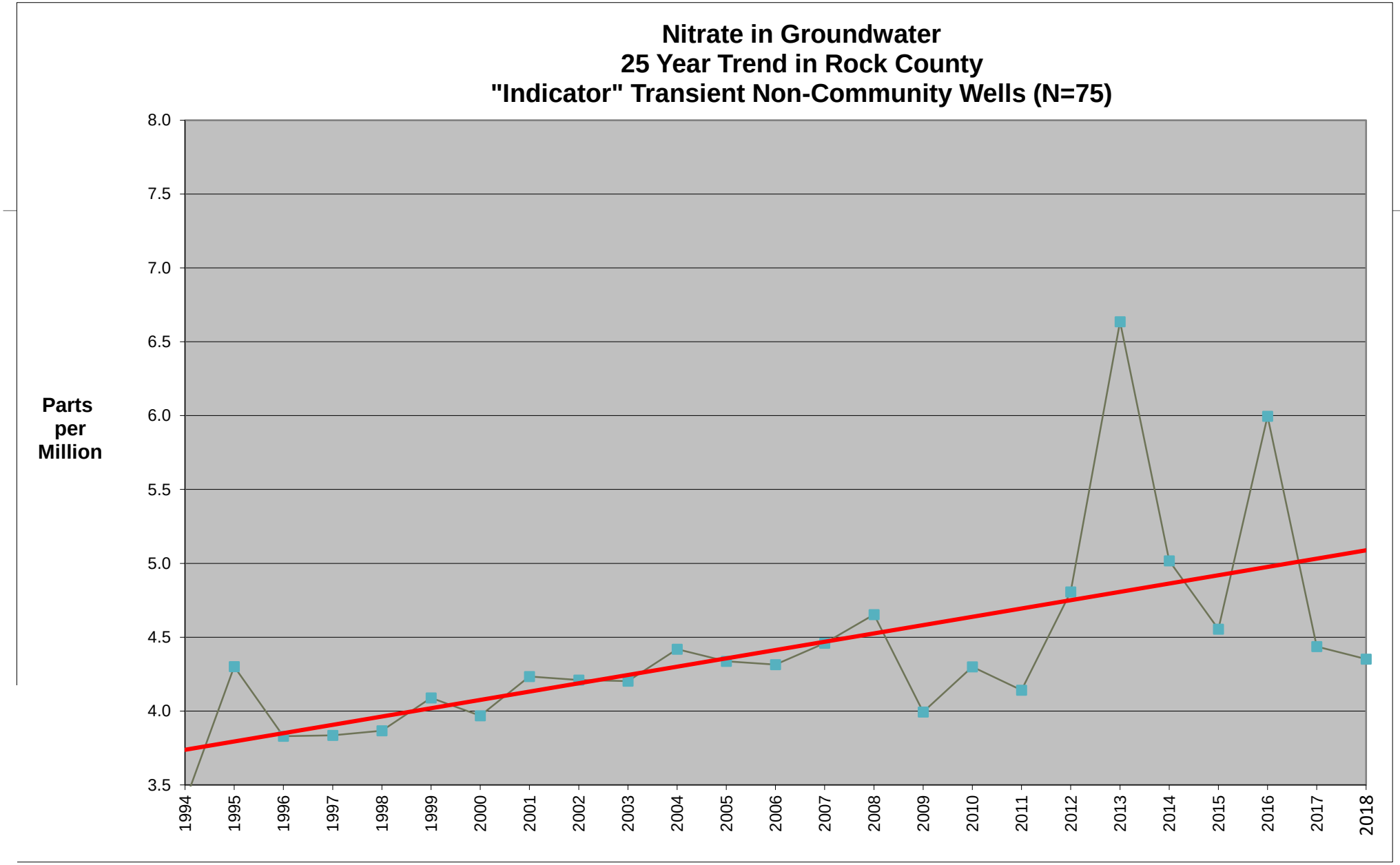


Source: UW-Stevens Point Well Water Viewer

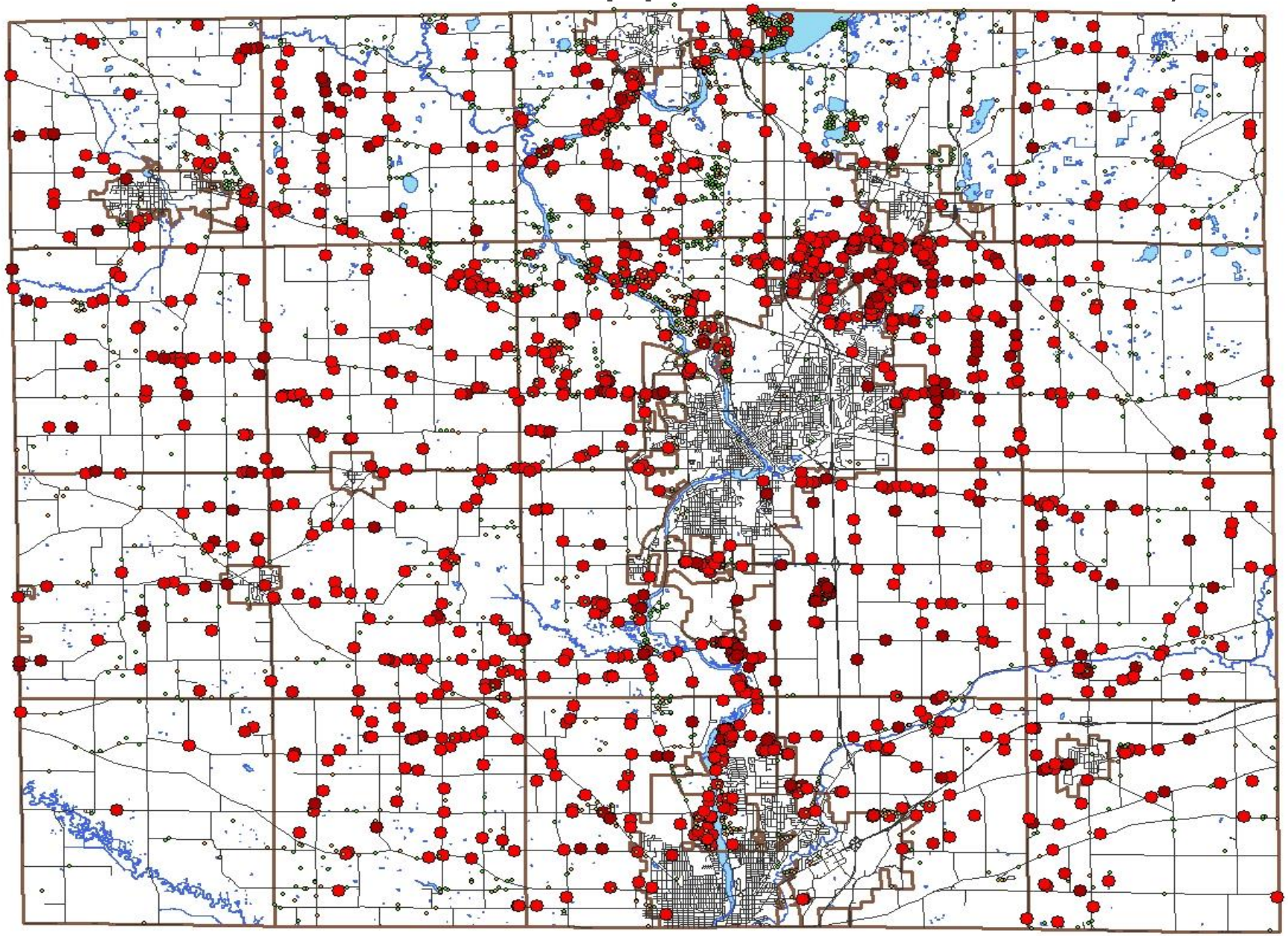
Rock County 27% >10mg/L Nitrates
Highest in Wisconsin

Collection of Local Nitrate Data

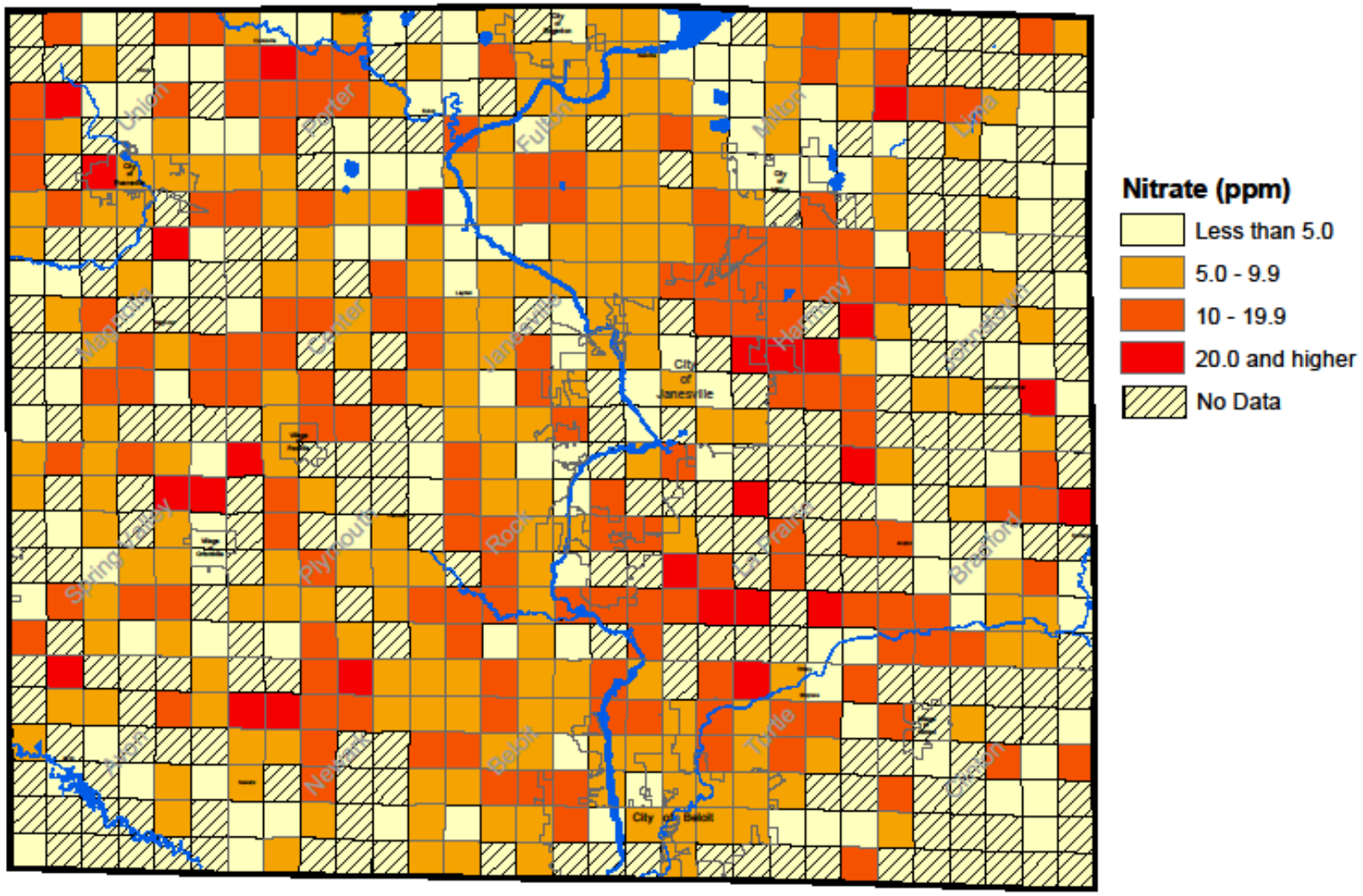
* **Municipal Well Impacts**
* **Transient Non-Community Well sampling**
  - 150 public wells tested annually for nitrates
  - Costly well replacements and/or treatment
    - 18 Facilities >10 mg/L may need new wells
* **Private Well Testing at Rock County Public Health Lab**
  - Approximately 800 wells tested annually for nitrates
    - An estimated 4000 wells exceed nitrate standards
      - Nitrate impacted wells not currently eligible for well compensation


Nitrate in Groundwater
25 Year Trend in Rock County
"Indicator" Transient Non-Community Wells (N=75)
Parts per Million
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

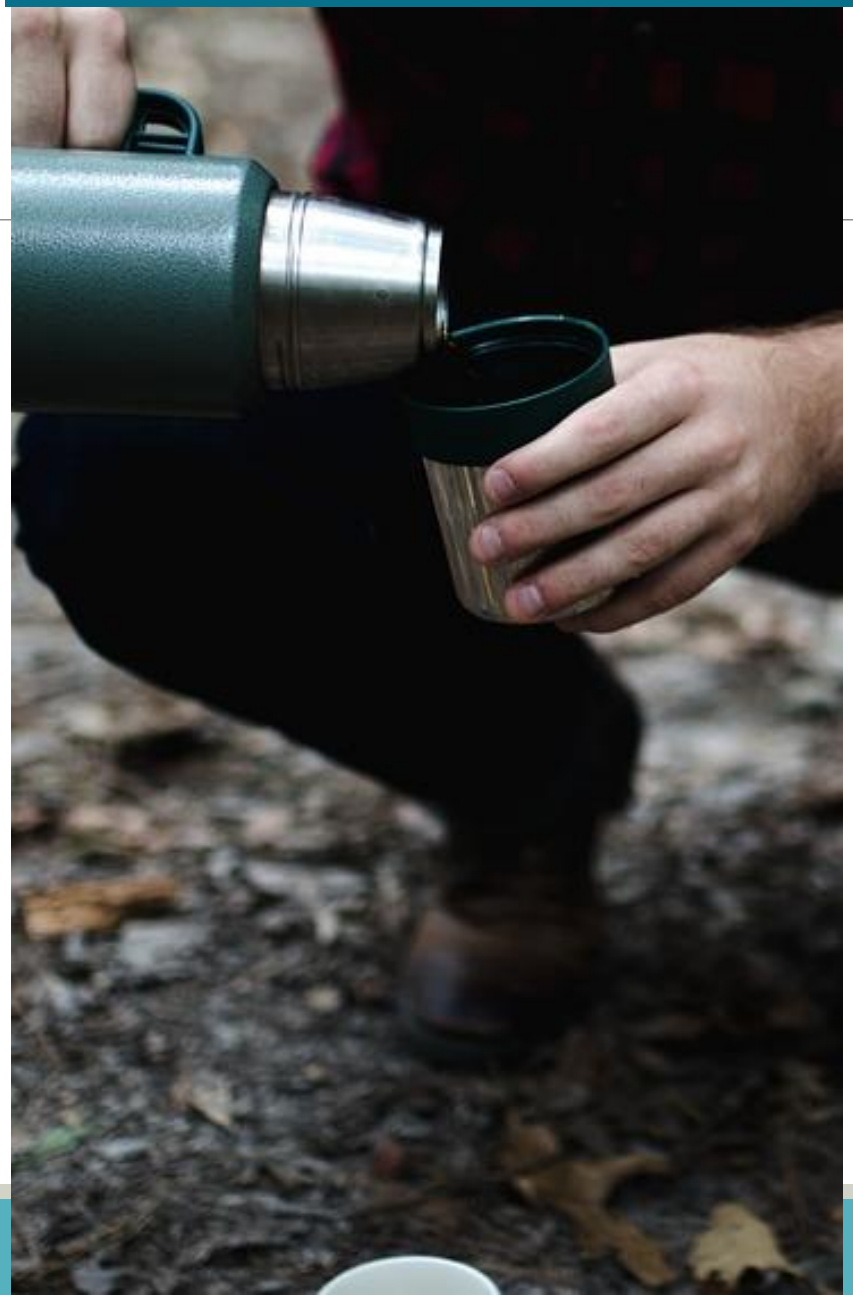
Nitrates More than 10 ppm Since January 2000



Average Nitrate Result by Section 2009-2019
Rock County, WI



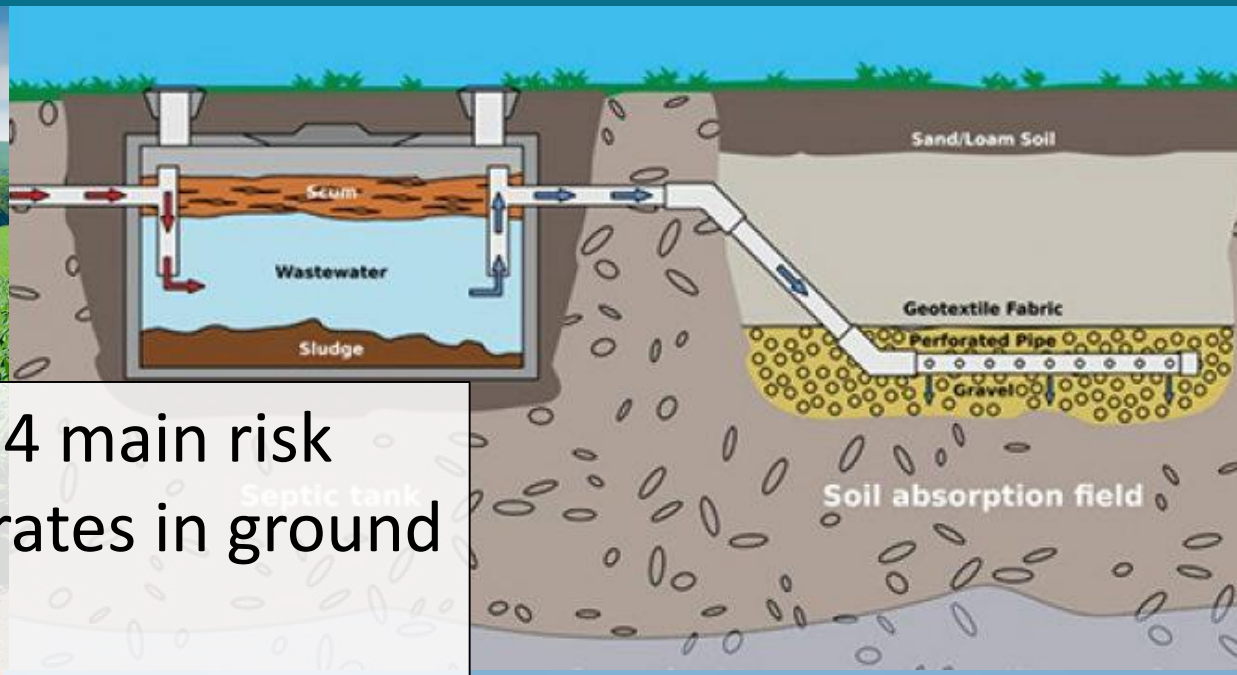
NITRATE IS A PRIORITY IN ROCK COUNTY



30%

Of private wells test above the EPA's maximum contaminant level (10 ppm)

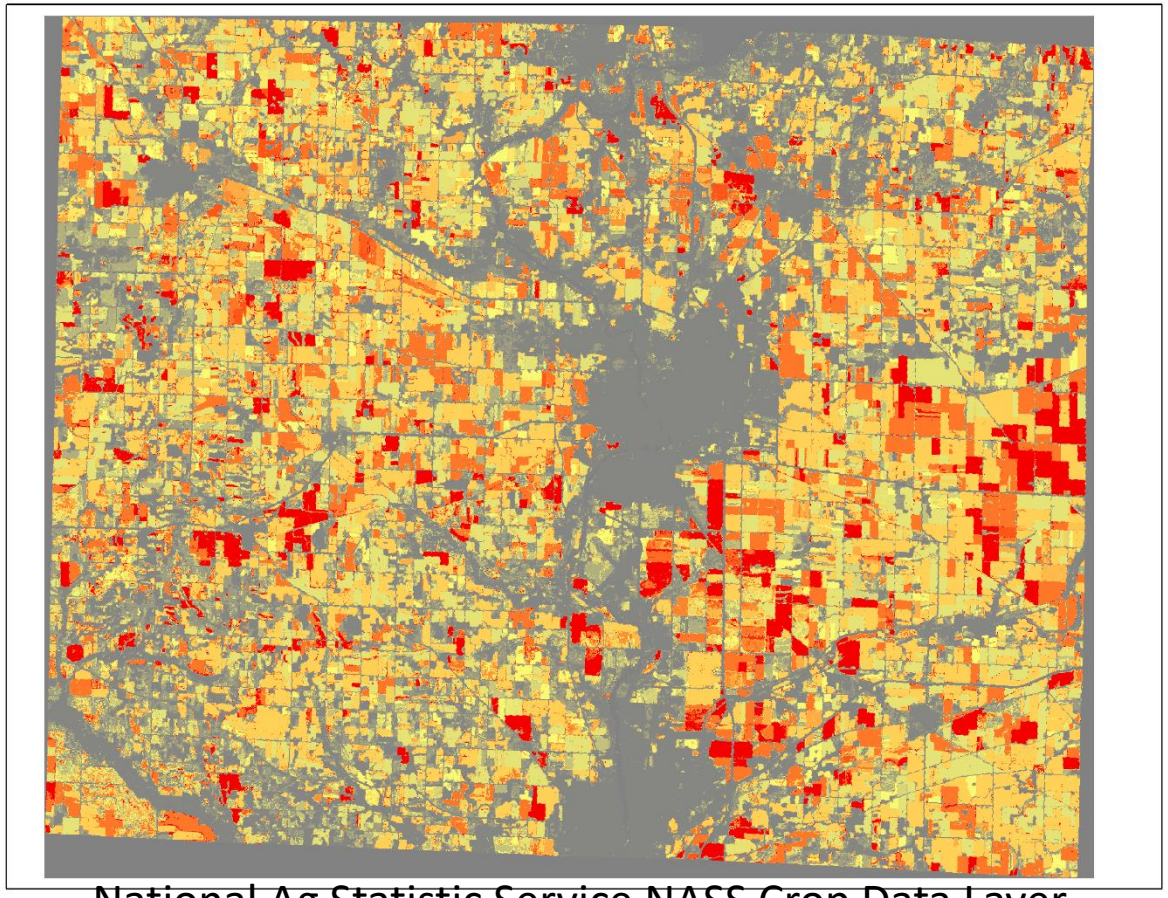
MODELING NITRATE RISK TO DRINKINGWATER IN ROCK COUNTY



We identified 4 main risk factors for nitrates in ground water:

- Land cover/Fertilizer Use
- Septic system density
- Soil properties
- Irrigation

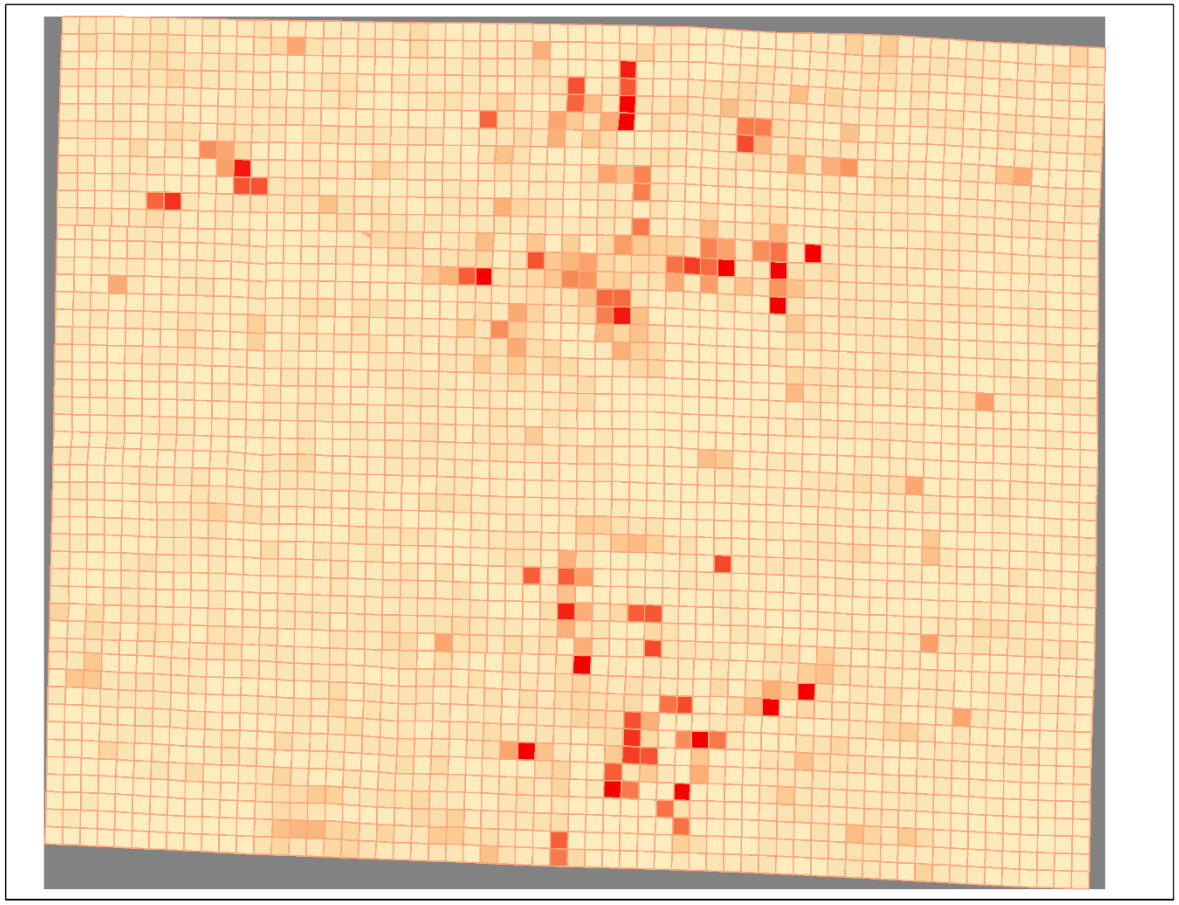
Land Cover Classification



National Ag Statistic Service NASS Crop Data Layer

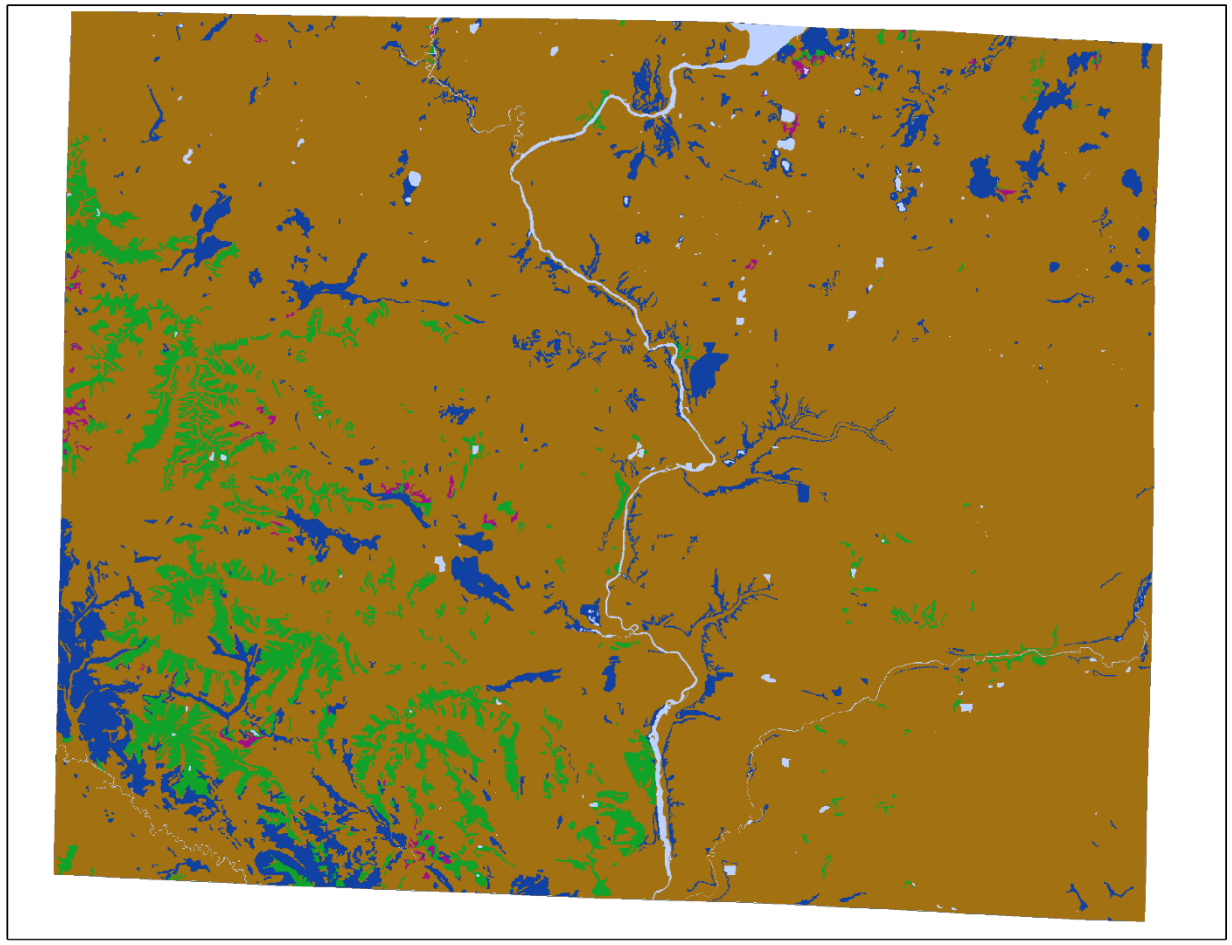
- Nitrogen fertilizer and leaching rates values were averaged throughout a 5-year time frame
- Values ranged from **0 to 53 lbs of Nitrogen per Acre** with areas in red representing the highest potential for nitrate loss.

Septic System Density Analysis



- The septic system density was represented by ¼ by ¼ county sections
- The number of septic systems with an area was multiplied by 20 to represent the nitrogen leaching and then divided by the total area to determine potential pound leached per acreage.
- Values ranged from **0 to 13.5 lbs/per acre** with areas in red representing the highest concentration of septic systems.

Soil Analysis/Leaching Potential

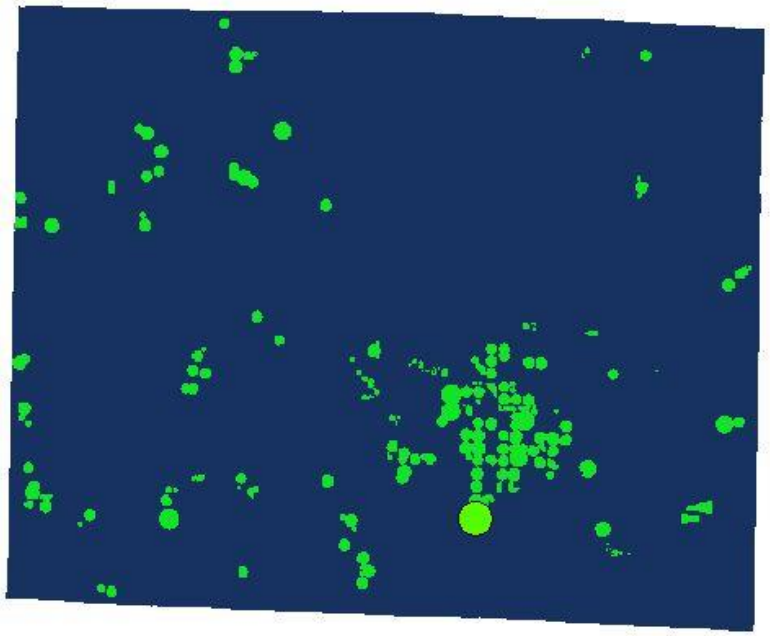


- Most of Rock county has a B soil group
  - Dark Blue ➔ Soil Group A
  - Brown ➔ Soil Group B
  - Purple ➔ Soil Group C
  - Green ➔ Soil Group D
  - Light Blue ➔ Water

- Each soil class was designated a multiplier for potential nitrate leaching.

- Soil Type A
  - Multiplier of 1.3
- Soil Type B
  - Multiplier of 1.1
- Soil Type C
  - Multiplier of 0.9
- Soil Type D
  - Multiplier of 0.7

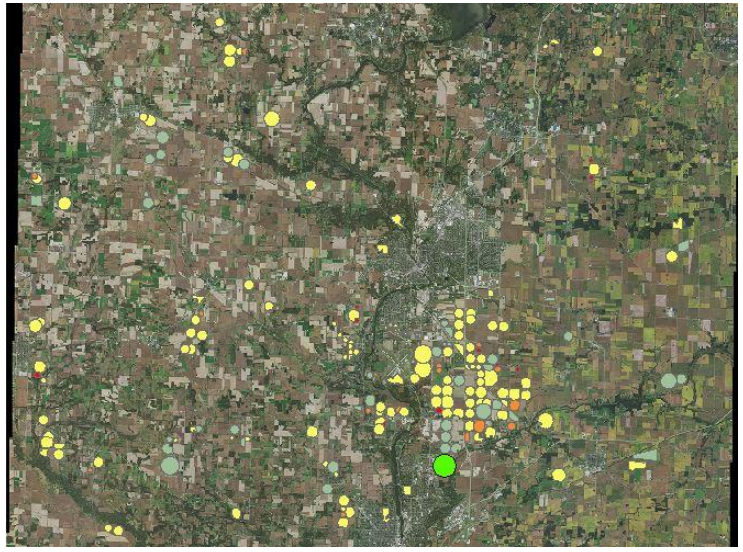
Irrigation

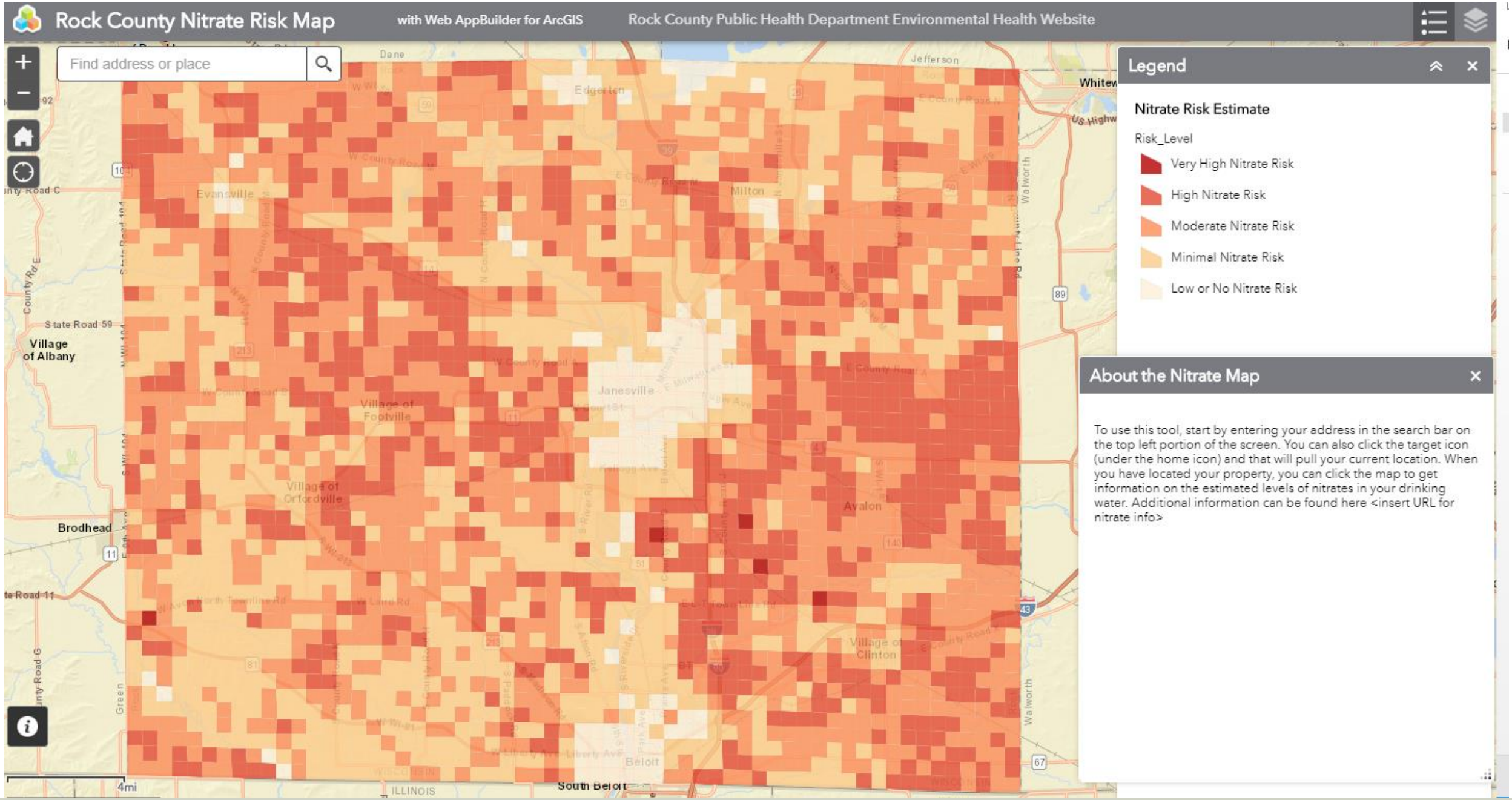


Top photo shows the multiplier ratings of 1 for blue (non-irrigated) and 1.15 for green (irrigated)

The multiplier of 1.15 represents a 15% increase in leaching potential which would represent an efficient irrigation program.

Bottom photo shows crop irrigation, highest values are in red indicating a large amount of water being used for those fields




Rock County Nitrate Risk Map
with Web AppBuilder for ArcGIS
Rock County Public Health Department Environmental Health Website
Find address or place
Legend
Nitrate Risk Estimate
Risk_Level
Very High Nitrate Risk
High Nitrate Risk
Moderate Nitrate Risk
Minimal Nitrate Risk
Low or No Nitrate Risk
About the Nitrate Map
To use this tool, start by entering your address in the search bar on the top left portion of the screen. You can also click the target icon (under the home icon) and that will pull your current location. When you have located your property, you can click the map to get information on the estimated levels of nitrates in your drinking water. Additional information can be found here <insert URL for nitrate info>
Dane
Jefferson
Edgerton
Evansville
Milton
Janesville
Village of Albany
Village of Footville
Village of Orfordville
Avalon
Brodhead
Beloit
South Beloit
ILLINOIS
4mi

Rock County Nitrate Work Group

WHEN WAS IT FORMED?

- - County Resolution June 2017
  - - Amended in Dec 2017 to Extend to Dec. 31, 2020

WHO IS ON THE WORK GROUP?

- - 12 person Work Group


Rock County Public Health
Planning, Economic & Community Development
Rock County Land Conservation
Nitrate Work Group
UW Extension Rock County
At Large Rock County Board Members
Ag Growers and Service Industry

Nitrate Work Group Mission Statement

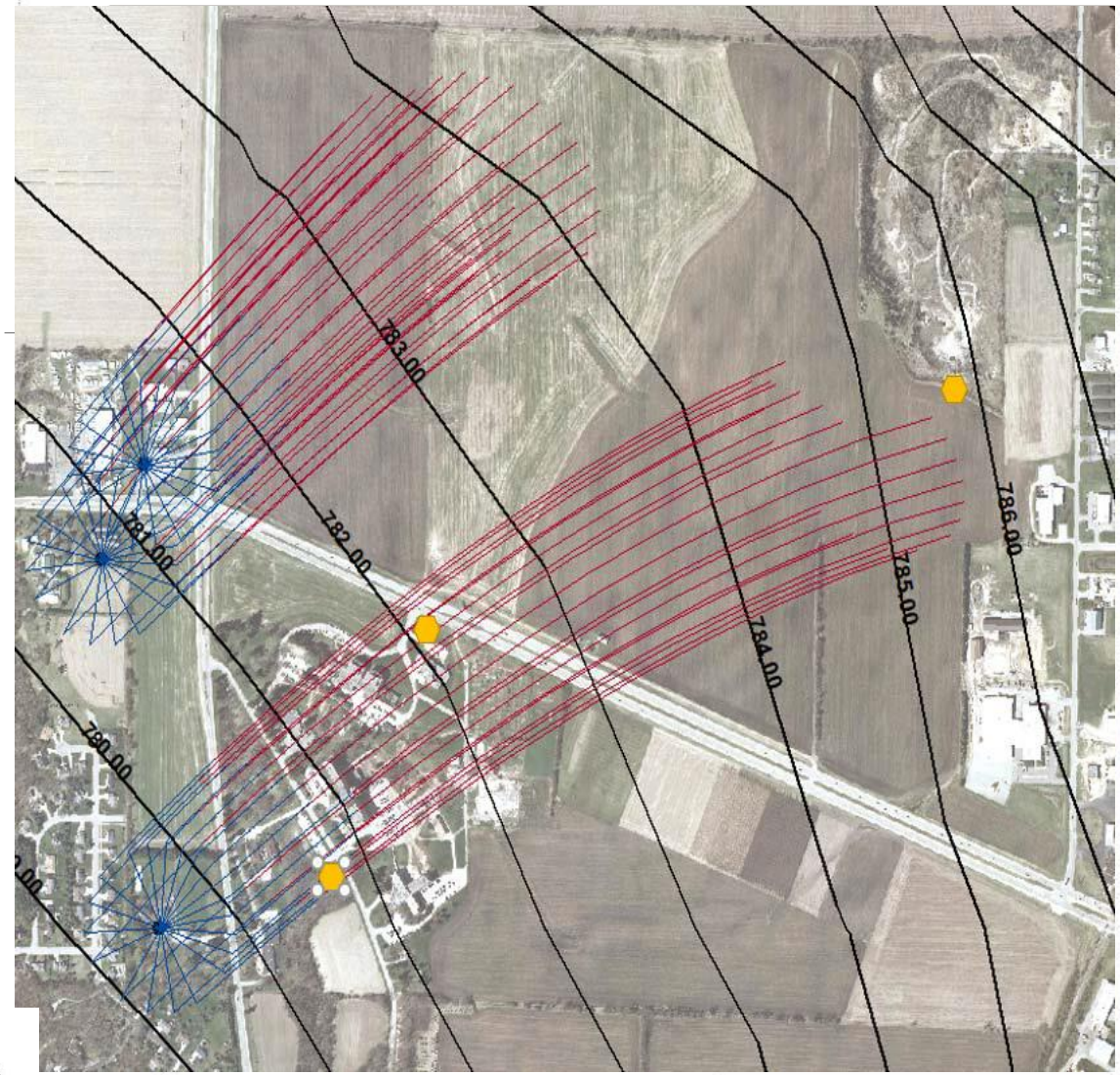
The Rock County Groundwater Nitrate Workgroup will analyze existing groundwater nitrate data, evaluate known best management practices to reduce nitrate leaching, and provide practical recommendations on short-term and long term methods to improve groundwater nitrate quality.

Evaluation of Potential Nitrate BMP Demo Areas(s)

- We **Identified Potential BMP Groundwater Areas** (2017/2018)
  - - geology, groundwater impacts, availability of indicator wells
  - - Work with Wisc Natural History and Geologic Survey

- We **Evaluated Potential Landowner Cooperation** (2018)
  - Farm community support
  - Develop Landowner Contracts

-Established Base Funding (Winter 2018)
  - ATC Funding
    - Used to install monitoring wells



N

1,500 750 0 1,500 Feet

Simulated capture zone

1 year time of travel

10 year time of travel

County Farm Area

WISCONSIN
Geological & Natural History Survey

Installation of Monitoring Wells

- Three Wells Installed (June 2018)
  - Upgradient well (background)
  - Near-downgradient well
  - Additional down gradient well
- Background Data (2018……ongoing)
  - Nitrate levels
  - Groundwater elevations
    - Groundwater flow direction
  - Evaluate trends over time

Also sampling
3 Public wells
monthly

County Farm Nitrate-Friendly Management Practices

- **New 5-year Contract with Grower (2019-2023)**
  - Required to follow nitrate-friendly management practices
  - Required to provide crop fertilizer and harvest data
  - Evaluate Groundwater and Ag Economics

- **Implement Best Management Practices** (2019 to 2023 and longer?)
  - ***Establish cover crops***
  - Utilize Crop Rotations
  - Consider fertilizer sources
  - Soil Testing
  - ***Fertilizer application timing***
  - Variable rate applications
  - ***Proper nitrogen crediting***
  - Setting realistic yield goals
  - ***Irrigation scheduling (if applicable)***
  - Tillage practices
  - ***Split applications of Fertilizer***
  - Plant tissue testing?

What's Next….
Farmer-Led Nitrate Initiatives?

- Farmer/Landowner Meeting Held March 4, 2019
  - Open conversations about nitrate issues
  - Concerns and ideas to reduce nitrates

- Possible formation of a Farmer-led Nitrate group?

Local Led Workgroup

Made up of:

-Farmers

-Ag Service Providers

-Landowners

Local Partners

- UW Extension
- Land Conservation
- NRCS
- Health Department
- Planning and Development

Working together to share ideas and come with solutions

Once organized there are funding sources available to support training, on farm trials, and outreach programs

Proactive Solutions

Working together on addressing the problem can:

- **Create practical and effective solutions**
- **Lead to positive change and greater efficiency in production**
- **Save on inputs while maximizing economic return**
- **Proactive approaches help decrease regulation potential**

Ignoring the issue won't make it go away

The problem didn't happen overnight……..

…….. we have a long row to hoe.